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EXAMINATION OF HUMAN CAPITAL INFLUENCE ON IRAN SHORT AND LONG TERM ECONOMIC GROWTH

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Resumen: En el presente estudio se ha intentado examinar la relación entre el capital humano y el crecimiento económico en Irán de 1991 a 2012 mediante el Modelo de Corrección de Errores y según el Método Auto Regresivo con Modelo de Retorno Distribuido Auto Regresivo (ARDL) a corto y largo plazo. Los resultados indican que la eficacia del capital humano en el crecimiento económico es positiva a corto plazo, lo que muestra la relación directa entre estas dos variables. Cuanto más capital humano, el crecimiento económico también aumentará. Sin embargo, a largo plazo, sólo la influencia del capital humano sobre el crecimiento económico ha tenido un efecto significativo, y el capital físico y la fuerza de trabajo activa no tuvieron efectos significativos, lo que representa un indicio del efecto de desbordamiento de estas variables en períodos de largo plazo.

Palabras clave: Modelo ARDL, Crecimiento económico, Capital, Fuerza laboral, Capital humano

Abstract: It has been tried in the present study to examine the relationship between human capital and economic growth in Iran from 1991 to 2012 by means of Error Correction Model along with Auto Regressive Method with Auto Regressive Distributed Lag Model (ARDL) in short and long terms. Results state that efficacy of human capital on the economic growth is positive under short term conditions, which is indicating the direct relationship between these two variables. The more human capital, economic growth will increase too. However, under long term conditions, only human capital influence on the economic growth has had a meaningful effect and physical capital and active labor force had no such meaningful effects that is in fact an indication of spillover effect of these variables under long term periods.

Keywords: ARDL Model, Economic Growth, Capital, Labor Force, Human Capital

1. INTRODUCTION

Economic Growth simply means the production increase in a country during a particular year in comparison with the real rate during basis year. In the classical Economists' theories, "Human" is considered to be just one of the production inputs in goods and services production cycle. Instead, "Capital Accumulation" is the key factor in economic growth and development. Economists such as Gorji (2003) have insisted for many years that inputs comprising the wealth of a country are merely its physical capitals, but a study by World Bank on 192 countries revealed that: "Physical capital, natural capital, and human capital comprise 16%, 20%, and 64% of a country's wealth, respectively."

Iran is also considered to be a rich country for the natural resources, but no optimal economic growth (without oil incomes) has been reached as a developing country due to the lack of human skills, production inefficiencies, lack of technological evolutions, etc. as well as the required fields of expertise for production and supply competitive goods to the international market. As such, economic growth in such countries may require more education to the labor force in order to form and develop human capital. In fact, education will lead to the expansion of labor force and increase of their skills and capabilities.

More investment on manpower will increase productivity level and technological evolutions and finally will provide the base for a higher economic growth level. Therefore, the present study aims to consider the influence of human capital on economic growth. Accordingly, the second section of this article will discuss theoretical basis of the above subject and review of the earlier studies. Section 3 will take a brief look at the structure. Section 4 will explain economic growth and human capital model for Iran and section 5 will examine the results out of this examination. The final section will provide conclusions and key notes.

2. THEORETICAL BASICS

2.1. Human Capital and Growth

Position of human capital in the economic growth models in the growth models of 1950s, economic growth has only been related to the amount of capital and labor force existing in the economy but some of the variables like human capital quality and labor force

health have been taken into account as non-economic inputs. However, modern management arguments on "Human Resources" and the strategies for evaluation of these resources in recent decades have found a special position and importance. Scientists believe that human capital on the one hand is one of the infinite resources but ignoring this may affect other resources too such that particular evaluation arguments have been raised for these kind of capitals in the modern accounting. Nowadays it seems human resources has to be cost and reflected as the part of companies' assets in their balance sheets. In fact, depreciation of these resources must be considered and calculated in a particular way. In many countries, human resources depreciation is one of the acceptable costs that even increase the profit. Other Per Capita incomes in the countries are not suitable bases in the international organizations for the examination of different economic conditions. Today, human development index is the newest modern criterion that determines position of any country in the United Nations' Table.

After floatation of currency rate and destroying traditional Dollar-Gold relation, human resources was emerged as a good support for production and money and an obvious principal. For the first time Adam Smith suggested that labor force in any country is the wealth of that country. David Ricardo reminded some remarkable issues on human resources, which was consequently theorized by Karl Marx.

People's partnership in the economic development, possibility of using health, education, and relevant items are considered to be other indexes from the evaluation of development in different countries, altogether named "Human Development Indexes" from the international agencies' point of view. By the time it was stated that per capita income of the European countries especially Scandinavian countries like Sweden, Denmark, Norway and others like Switzerland, America, and Japan is very high, international agencies were immediately trying to classify countries into poor and rich. However, as income distribution inside the countries is nowadays following with a deep gap and also the distance between poor and rich countries is increasing, economic growth and per capita income are facing a kind of doubt. For many years, global economic theorists are introducing "Human" as the development origin and even modern growth theories rely on human beings. This means human's investment on physical and mental aspects is believed to be the most reliable pre-condition for moving towards optimum economic development. Those societies focusing on the

formation of human capital have had a better performance regarding economic growth, occupation, reduction of poverty, and fair distribution of income. Indeed, increase of knowledge and skills is the necessary requirement to remove economic deficiency, unused economic capacities, and making necessary motivations for improvement (Taghavi, 2005).

2.2. Different Roles of Human Capital

There are different roles in the economic growth literature for human capital: First, human capital is considered to be a separate factor for production as like "Mankiw", "Romer", and "Will" (Romer, 1986), (Romer, 2001), ; Second, human capital is the origin of innovative activities and important inputs for the basic knowledge foundation as like "Nelson", "Phelps", and "VorsePargen"; Third, more human capital saving and reserve will ease the possibility to attract discovered products and thoughts from other locations for the countries and finally a better utilization of potential power, like "Nelson and Phelps", "Sterlin", "Abramowitz". Fourth, human capital may have positive external effects, meaning that human capital or a worker's knowledge may increase his colleagues' productivity (as like "Lucas"). Also in a study of growth comparison between countries, human capital had a meaningful explanatory power. In these relatively initial studies; registration rate for education levels (a current variable) has been used as the index for human capital accumulation. "Wolf" and "Gitleman" applied World Bank data for the establishment of education success rate for the 25-year old population and higher in elementary, intermediate, and higher education levels. They used certification achievement rate (education success) as the independent variable. Their principal conclusion was that although education success rate is logically a better index for education as a production input, registration rate is somehow a powerful explanatory factor for per capita income growth.

Another probable explanation for this conclusion is that mutual causal relationships, high and increasing registration rates may be the result of growth, not a determinant factor for it. Next important conclusion in the study by Wolf and Gitleman is that education success has a meaningful effect on the human capitals investment (Wolf, 1994). Hence, human capital may have indirect important influence on economic growth.

Baroo (1992) suggested renovation variables for the education success rate as an independent variable in

preliminary regressions (Education success in his regressions was measured as the average of education years by 25-year-old people and higher ages. In addition, gross domestic product growth rate was applied as a dependent variable and his data collection consisted of 73 countries during a five years period). He reached the powerful independent effect of education on growth: 50% increase in the education years will increase 1% growth rate per annum. However, as the investment and productivity variables are added as the independent variables, direct effect of education years will be decreased to half. Considering more regressions indicate that human capital almost affects the growth positively through its reciprocal positive influence with physical investment and its reciprocal negative influence with productivity rate. Therefore, both the above studies focus on the indirect influence of human capital on economic growth by means of human reserve factor.

All the above-mentioned studies have stated that human capital accumulation is vitally important for the economic growth. Sometimes it is suggested that we have to accept causal explanation of the relationship between education success and growth, although this relationship is remarkably positive. In addition, it is possible that investment on human capitals may increase as the result of fast economic growth. Despite, Katz indicated that studies on micro and macroeconomics concerning the relationships between education and productivity has a relatively good consistency, and this issue well states the causal explanation of macroeconomics findings regarding effects of human capitals investment on economic growth. Investment on human capitals is measured based upon quantity of educated years, educational expenditures as a share of gross domestic product, etc. However, this is an educational input, not an output. That how much educational inputs may indicate educational outputs is different between countries. Decision making for human capital is considered to be a separate investment decision. In other words, decision based upon utilization of human capital is determined through its output rate. This rate is totally different amongst countries and their educational levels. Due to the above fact, we would be able to find issues in which resources allocated to education are frequent but measured influence on growth is little. Therefore, investment on human capital may be endogenous, meaning that people may balance their actual investment on human capitals in relation to its output rate, which is determined institutionally.

3. REVIEW ON ACCOMPLISHED STUDIES

In the initial models of economic growth by Harvard (1984) and Demar (1947) in their point of view, population growth rate is considered to be an important growth factor, without any indication of human capital. These models were completed by Solow (1956) and Swan based upon physical capital, inclusion of technology, and production function.

As per the experiences by developed countries, economic growth only through physical capital is not sufficient but education is much better amongst principal factors that have resonated the economic growth and increased productivity of human capital in these societies. According to Sakharopolos, discussions regarding educational role in growth starts with the works done by Solow (Motovaseli, 2004), although he has not measured the share of education in growth. Using production function in a 40-year period, Solow showed that around 90% of per capita production increase has been reached through some factors other than physical capital and labor force. He called these factors "Technological Changes". Grillikhz (1964) inserted education into the production function as a variable and concluded that education is an important variable to reach growth.

Denison (1967) evaluated 9 European countries by means of production function and statistical data after the war. He considered education as the number of education years by the labor force.

Through the production function in the form of Cup Douglas with three variables including capital, labor force, and education, Walters and Robinson (1980) indicated that education is an important factor for production.

Peter Chin (1980) indicated in a research that education share in labor force's quality growth from 1947 to 1967 has increased progressively and reached to 8%, but the same for 1970 to 1974 was 6.7%.

Studies by Baroo suggested that number of education years during high school and higher levels for the men with more than 25 years of age has a meaningful influence on economic growth. Likewise, education quality from the education quantity will become more important, which is gained via average high school and university education years.

According to Pritchett (1998) and Ben Habib and Spiegel (1994), a positive relationship exists between human capital and growth and growth rate was faster in those countries with more human capitals.

Emadzadeh et al in a study based upon Cup-Douglas Function have considered the role of human capital in gross domestic product. In this examination, evaluated coefficients indicated a meaningful relationship. Likewise, it was stated that any country requires human capital in addition to the physical capital in order to reach economic growth, among which higher education is considered to be the most important human capital.

In another research by Alaviand Nasirzadeh, causal relationship between economic growth and human capital is evaluated through Granger Causal Test for the years from 1969 to 1996. They concluded that firstly investment on education and human resources is formed and then economic growth is gained.

Salehi (2000) discussed the influence of human capital on economic growth and concluded that human capital variables like registration rate in different educational grades, educational years, and educational expenditures have meaningful and positive influence on economic growth.

Taghavi and Mohammadi (2003) examined the influence of human capital on economic growth in the period of 1959-2002 and concluded that average growth of labor force's educational years and adults' educational growth have positive and meaningful influence on gross domestic product during the aforesaid period.

Alamiand Jamshidnejad (2008) have also studied the influence of education on economic growth for the years from 1971-2003 by means of Lucas Model and concluded that education has positive and meaningful influence on economic growth.

All the above-mentioned studies suggest that human capital accumulation for the economic growth is vitally important. Sometimes it is discussed that although a positive and remarkable relationship exists between educational success and growth, its causal paraphrase must be accepted with discretion. Additionally, it is possible that investment on human capitals may increase as the result of fast economic growth.

Despite, Katz indicated that studies on micro and macroeconomics concerning the relationships between education and productivity has a relatively good consistency, and this issue well states the causal explanation of macroeconomics findings regarding effects of human capitals investment on economic growth.

4. RESEARCH METHOD

4.1. Experimental Test for the Influence of Human Capital on Economic Growth

In this study, influence of human capital on the Gross Domestic Product (GDP) growth is evaluated by means of a growth endogenous model. Earlier studies on the role of human capital in economic growth are divided into two groups using production function, among which the difference is related to the type of variable applied as the human capital representative or the method of insertion of the desired variable. The main point in these studies is that human capital plays an important role in economic growth. However, as per the description of this variable and relevant measurements, researchers have gained different results and their results mostly depend upon their applied method.

Schultz, Harber Groslovsky have added the amount of allocated capital to education in the Production Function as the human capital index (Sakharopolos1994) since Schultz have introduced this issue from investment point of view, meaning that a type of investment will create a type of new input in growth process by which it may grow. He called this "investment in human resources".

As per Schultz's theory, total production function will be as follows (Schultz, 1961):

$$y = f(k, L, rKE) \quad (1)$$

where

k, L, rKE are the physical capital, labor force, and education capital stock, respectively.

The base for applied model in this section is the production function with fixed outcome to the scale:

$$Y_t = A.F(K_t, L_t, Z_t) \quad (2)$$

Where

Y = total real product in economy

A = total production technology

Z = other factors influencing on the economic growth

K = capital stock

L = total labor force

t = different years

If we suppose production function is of Cup Douglas type, the following relation will gain through the logarithm. In order to examine the relation between

physical capital, human capital, and gross domestic product, the following regression model is estimated:

$$\text{LNgrowth} = \alpha_0 + \alpha_1 \text{LNInvest} + \alpha_2 \text{LNwork} + \alpha_3 \text{LNstudent} + \alpha_5 \text{plans} + u \quad (3)$$

Now using the aforesaid production function, we are going to examine the influence of human capital on economic growth by means of ARDL Model.

4.2. Definition of Model Variables

Gross domestic product (Growth): Monetary value of the whole finally produced goods and services to the base annual price in the economy of a country within a specific fiscal period (one year) is called "Actual Gross Domestic Product). In the present study, Actual Gross Domestic Product has been used based upon data of Central Bank of Iran to the fixed prices of 1997.

Active Labor Force as the second human capital variable (Work): Includes people of more than 10 years old, having both ability to work and tendency to do the jobs. Applied data for this variable in the present article are based upon data published by Iran Statistics Center and Planning and Management Organization.

Human capital (number of students) or the first variable for human capital: Education, experience, and health are the three humanistic dimensions, amongst which education is THE most important. In this study, total number of students (total number of students at Azad and State Universities) are taken into account as the human capital index. Date related to this variable are based upon data published by Iran Statistics Center and Planning and Management Organization.

Physical Capital (Invest): Total Capital (Billion IRR)

X1=DU1368-1372: Virtual variable, first development plan during 1989 to 1993 namely "Construction Period"; its value for the aforesaid period is 1 and the same for other years is 0.

X2=DU1374-1378: Virtual variable, second development plan, which is called "Construction Period" and for the period of 1995 to 1999 is equal to 1 and the same for other years is 0.

X3=DU1379-1383: Virtual variable, third development plan, which is called "2nd Reform Period". Its value from 2000 to 2004 is equal to 1 and the same for other years is 0.

X4=DU1384-1388: Virtual variable, fourth development plan, the value of which is 1 for the

period from 1384 to 1388 and the same for other years is 0.

To examine and test human capital growth effects on Iran's economic growth, two replacement variables are applied for human capital. The first variable is average educational years of employed labor force extracted from the studies by NiliandShahabi. The second replacement for human capital is adults' literacy percentage extracted from World Bankresources.

4.3. Research Spatial and Time Domains

The aim of this study is to examine the influence of human capital on economic growth. As such, model space includes variables like physical, human capital, and economic growth. Human capital variable, against economic growth, has no specific unit and index and we are able to consider various indexes for it. Taking into account available values and figures, total number of students, active population, and physical capital have been used in the present article. Independent variable in this study is economic growth, and we also added some other variables related to the Islamic Revolution and Imposed War in order the draw a good picture of human capital role in economic growth.

The statistics applied for this research are related to the time series from 1991 to 2012 for Iran, mostly taken from Central Bank of Islamic Republic of Iran as well as the statistical calendar published by Iran Statistics Center. Auto Regressive Distributed Lag (ARDL) was applied for the estimation of this model. Microfit Software was used for the model evaluation.

4.3.1 Model Specification

Accomplished studies on the role of human capital in economic growth are divided into two groups by means of production function, in which the point of difference is the type of variable used as the representation of human capital or insertion method for the desired variable. By the way, fundamental basis for these kind of studies is that human capital plays an important role in economic growth. However, as per the description of this variable and relevant measurements, researchers have gained different results and their results mostly depend upon their applied methods.

Schultz, HarberGroslovsky have added the amount of allocated capital to education in the Production Function as the human capital index

(Sakharopolos1994) since Schultz have introduced this issue from investment point of view, meaning that a type of investment will create a type of new input in growth process by which it may grow. He called this "investment in human resources".

As per Schultz's theory, total production function will be as (1).

Now we are going to discuss the influence of human capital on economic growth by means of ARDL Model and the above production function.

To check the relationship between physical capital, human capital, and gross domestic product, the following regression model is generally estimated:

$$\text{growth} = \alpha_0 + \alpha_1 * \text{investment} + \alpha_2 * \text{work} + \alpha_3 * \text{student} + \alpha_5 * \text{plans} + \text{ut} \quad (4)$$

Table 1 shows the variable specifications in the study.

Table 1: Variable specifications in the study
Source: Researcher's calculations

Research variables	Abbreviation form
Actual gross domestic product logarithm	LNgrowth
Active population logarithm	LNwork
Human capital logarithm	LNstudent
Physical capital logarithm	LNinvest
First development plan	Plan 1
Second development plan	Plan 2
Third development plan	Plan 3
Fourth development plan	Plan 4

First of all, a test is performed on each variable. In case ADF statistic absolute value is smaller than the absolute value of critical values under meaningful level of 5% and 1%, this will be accepted on the condition that time series in the data level is unstable. In such case, we calculate the difference one time and perform ADF Dicky-Fuller test on the data differences. If ADF absolute value for the time series with one time calculating the difference is larger than the absolute value of critical values under meaningful level of 5% and 1%, this will be accepted on the condition that relevant time series has become stable with the order of I(1).

According to the above, Dicky-FullerandDicky-Fuller Test has been generalized for each individual variable by means of Eviews Software and the results summary is provided in Table 2.

Unit root test including y-intercept has been done for all the variables. Through the comparison of statistic and critical values, results indicate that all the variables (on the level) with this model have been unstable. Thereafter, unit root test is repeated for the first order difference of the desired variables through above procedures.

Table 2: Test results for Dicky-Fuller unit root popularized variables "main variables" in the first difference Source: Researcher's calculations

Variable		ADF figure	Critical Value			Total Result
			10%	5%	1%	
Actual gross domestic product logarithm	LNgrowth	-4.1	-3.96	-2.94	-2.61	Stable
Active population logarithm	LNwork	-3.61	-3.96	-2.94	-2.61	Stable
Human capital logarithm	LNstudnet	-4.36	-3.96	-2.94	-2.61	Stable
Physical capital logarithm	LNinvest	-5.2	-3.96	-2.94	-2.61	Stable

Once more, unit root test is performed on the first order difference of our variables through the above procedures. Results indicate that research variables have become stable by the calculation of difference for one time. In other words, all the variables become stable and accumulation is the first order I(1) type.

As the variables accumulation order is gained, we will estimate the models. We are able to estimate the model in case variables have similar accumulation orders, since the pattern ensures applied for this study is ARDL.

5. MODEL EVALUATION

5.1. Short Term dynamismtest

In this section we are going to identify influential factors on Iran's economic growth regarding growth model expansion as an effective factor on the labor force, physical capital, oil price, and human capital, and their effectiveness. Taking into account the fact in growth models that some variables have been introduced as the most fundamental influential variables on Iran's economic growth, variables including active population logarithm, human capital logarithm, physical capital logarithm, development plans have entered into the model as the influential variables on economic growth variable. The general form is as follows and economy measurement model of Iran's growth function is explained as below:

$$\ln growth_t = \beta_0 + \beta_1 \ln investment_t + \beta_2 \ln student_t + \beta_3 \ln plans_t + U_t \quad (5)$$

As per the above model as well as the basic pioneering variables bases upon theoretical aspects, we inserted the following variables into the model:

- Actual gross domestic production logarithm: LNgrowth
- Active population logarithm: LNwork
- Human capital logarithm: LNstudent
- Physical capital logarithm: LNinvest
- First development plan: Plan 1
- Second development plan: Plan 2
- Third development plan: Plan 3
- Fourth development plan: Plan 4

Results out of the estimation of dynamic equation are summarized in Table 3.

Table 3: Dynamic equation results (LN growth dependent variable) Source: Researcher's calculations

Variable	Symbol	Variables	Hard Devi	Probability
Actual gross domestic production logarithm with one lag	(-1)LNgrowth	1.0572	0.11256	[000.]9.5454
Actual gross domestic production logarithm with two lags	(-2)LNgrowth	0.49073-	0.11735	[048.]4.4545-
Physical population logarithm	LNinvest	0.11472	0.02467	[000.]4.6504
Active population logarithm	LNwork	0.16241-	0.08288	[064.]1.9597-
Human capital logarithm	LNstudent	0.66748	0.12655	[000.]5.2744
Human capital logarithm with one lag	(-1)LNstudent	0.53465-	0.13413	[001.]3.9859-
y-intercept	C	0.85287	0.4722	[086.]1.8062
First development plan	Plan1	0.1499-	0.03204	[000.]4.6786-
Second development plan	Plan2	0.072258	0.02867	[020.]2.5202
Third development plan	Plan3	0.05086-	0.02463	[052.]2.0651-
Fourth development plan	Plan3	0.05086-	0.02463	[052.]2.0651-

Short term evaluation results indicated that growth variable with the two second delays, physical capital, number of active population, number of students, and

development plans have meaningfully affected the economic growth.

Table 4 shows the diagnosis and goodness off it test for the short term model.

Table 4: Diagnosis and Goodness of Fit test for the short term model. Source: researcher's calculations (meaningfulness of all the variables are checked in confidence level of 0.95)

Goodness of Fit		
Adjusted factor (\bar{R}^2)	Statistic F	Durbin-Watson Statistic
0.99	F-stat. F(9, 20) 18.36.2[.000]	1.98

Calculation quantity of statistic “F” in the meaningfulness level of 10% also indicates that the whole regression equation is not rejected statistically. In addition, explanatory power of the model is 0.99. Prior to the evaluation of long term coefficients by ARDL Model, it is necessary to perform co-integration test in order to assure existence of a long term relationship between variables on Iran's economic growth. This equation becomes dynamic through adding the lags and existence of LNgrowth lags will prevent from false regressions because independent variables may be unstable. In addition, this may encompass the influences of other removed factors from the model.

In the assumptions statement we had: Assume that other factors are fixed, capital will increase the economic growth.

In the aforesaid model, human capital had a coefficient equal to 0.66 and this positivity indicates a direct relationship between these two variables. The more human capital, economic growth will increase more.

Finally, the above-mentioned assumption is accepted. In addition, Durbin-Watson Statistic is equal to 1.98.

5.2. Long Term Test

As the dependent variable coefficient to the lag in the right side of this equation for evaluated ARDL model is zero. Therefore, as Banerjee test statistic and Dolado, test result of the unit root is equal to zero and there is no accumulation, which is due to the long term relation between variables.

Table 5: Long term relation results (LN growth dependent variable). Source: Researcher's calculations

Variable	Symbol	Variables	Standard Devia	(Probability)T-Statistic
Physical capital logarithm	LNinvest	0.08981-	0.21633	[682.]41518.-
Active population logarithm	LNwork	1.0578-	0.46219	[033.]2.2887-
Human capital logarithm	LNstudent	0.86516	0.16612	[000.]5.2080
First development plan	Plan1	0.49396	0.12803	[001.]3.8581
Second development plan	Plan2	0.07263-	0.04081	[087.]1.7575-
Third development plan	Plan3	0.57104	0.25084	[034.]2.2765
Fourth development plan	Plan4	0.63151	0.13029	[000.]4.8470
y-intercept	C	5.555	2.6448	[049.]2.1003

In long term conditions, both physical capital and labor force had a negative influential factor on economic growth. This negativity is due to the manpower surplus and its extra amount during the above long term period. This surplus has put the production process into difficulty.

Long term model evaluation is mostly related to the elongations, which determines sensitivity of growth rate to each of the variables. In this regard, long term growth had the most sensitivity on 5-years programs. However, human capital had also a meaningful effect on economic growth, though the active population and physical capital had no effects on economic growth under long term conditions.

Now we are going to apply ECM model to examine how adjustment of the short term imbalances in economic growth moves towards long term adjustment. ECM coefficient indicates how much percentage of short term imbalances is adjusted towards long term balance at each period. In other words, how long does it take to return economic growth to its long term progress? Error correction factor in this model is 0.15, i.e. 0.15% of economic growth imbalance is adjusted at each period and approaches the long term progress. Difference of actual gross domestic product logarithm with 1 lag

Table 6: Results out of Error Correction equation (LNgrowth dependent variable)Source: researcher's calculations

Variable	Symbol	Variables	Standard Deviation	(Probability)T-Statistic
Difference of actual gross domestic product logarithm with 1 lag	dLNgrowth	0.31073	0.14735	[047.]2.1088
Difference of physical capital logarithm	dLNinvest	0.11472	0.024668	[000.]4.6504
Difference of active population logarithm	dLNwork	0.16241-	0.082875	[063.]1.9597-
Difference of human capital logarithm	dLNstudent	0.66748	0.12655	[000.]5.2744
Difference of first development plan logarithm	dPlan1	0.69035	0.39951	[096.]1.7280
Difference of second development plan logarithm	dPlan2	0.02493-	0.011393	[083.]1.7945-
Difference of third development plan logarithm	dPlan3	0.32744	0.10554	[005.]3.1024
Difference of fourth development plan logarithm	dPlan4	0.1055	1.5276	[946.]069059.
Difference -of y intercept	dC	0.85287	0.4722	[085.]1.8062
Error Correction	(-1)ecm	0.15353-	0.071255	[042.]2.1547-

In the above table, “d” indicates the first order difference of variables. As it is observed, all the coefficients in this model are meaningful under 90% certainty level according to the probability of relevant “t” statistical quantity.

6. SUMMARY AND CONCLUSION

Generally in the economic growth literature, there is a tight link between the rate of labor force's education and their productivity in production process. Evidences in the industrial countries indicate a powerful relationship between investment on education of human capital and economic growth. As such, many developing societies including Iran have invested lot of money in this section.

Most of the economists agree that human resources determine economic process on a country and its influence on economic process is not less than physical capital. However, this does mean physical capital and machinery play negligible role in modern economies. Anyhow labor force, skilled managers, and creative clients in economy are necessary for the efficient utilization of these equipment and machinery.

Relationship between human capital and economic growth was the main topic of this research. For this purpose, we calculated human capital of university graduates as well as the economic growth at the initial stage. Thereafter, unit root and accumulation tests were carried out in order to get a reliable test. Time series for human capital and economic growth variables and other variables in the first order difference were stable. Research findings indicate that a relationship exists between human capital and economic growth in short term conditions but the most important thing in long term conditions is physical capital. It is concluded that human capital has led to the human capital growth from 1991 to 2012 and physical capital has increased long term growth of the economy.

It seems labor force in those countries with more investment on their human resources have a higher technical knowledge and educational level; they are able to produce more industrial goods and supply the same to the global markets. In other words, expansion and development of international trade is reached through educating human resources that will consequently play a very important role in productivity of the whole production elements and getting higher economic growth rate. Organizations have to pay much attention to the other types of knowledge as like social and organizational capitals. Therefore, it is required that researchers carry out more studies concerning the combination procedure of various knowledge in an organization (humanistic, social, and organizational) in order to reach a competitive advantage.

It is tried in this article to examine relationship between human capital and economic growth by means of Auto Regressive Distributed Lag (ARDL) and to evaluate the influence of human capital on economic growth. Evaluated results for the period of 1991-2012 indicate the positive and meaningful influence of human capital on the economic growth.

The important element in short term equation (ECM) is ECM(-1) coefficient, which is the indication of "speed of short term imbalance adjustment towards

long term balance". As shown in the above table, ECM(-1) coefficient is approximately -0.15, expressing a relatively low speed of short term imbalance removal and move towards long term balance and also indicates that 0.15 of the economic imbalances are removed in each period.

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